

Ebinania australiae, a New Species of Fathead Sculpin from Southern Australia (Scorpaeniformes: Psychrolutidae)

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ABSTRACT. A sixth species of *Ebinania* is described from nine specimens collected at depths of 982–1170 off southern Australia. Eight of the specimens were from the vicinity of Tasmania and the nearby mainland, and the ninth is from near Perth, Western Australia. The new species differs from its congeners in having cirri on the head, well-developed orbital rims, cranial arch 3 twisted upwards, prevomerine teeth in a continuous band, a single terminal chin pore, obsolete lateral line pores, and an overall pale colour. This is the third species of psychrolutid known from off continental Australia. Variation in important characters used in diagnosis of species of *Ebinania* is reported and problems of the characters in diagnosing these species are discussed. A key to species of *Ebinania* is provided.

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Introduction

The genus *Ebinania* was erected for a new psychrolutid from Japan, *E. vermiculata*, by Sakamoto (1932). *Ebinania* remained monotypic until Nelson (1982) reassigned *E. brephocephala* (Jordan & Starks, 1903) and *E. costae-canariae* (Cervigón, 1961) from *Cottunculus*, and described two new species, *E. macquariensis* and *E. malacocephala*. Since then, no other species have been assigned to *Ebinania*. Psychrolutids have been known from off continental Australia since *Psychrolutes marcidus* (McCulloch, 1926) was described from off southeastern Australia. Until now, only one other psychrolutid, *Psychrolutes occidentalis* Fricke, 1990, has been found off continental Australia (off northeastern Australia). Herein we describe a new species of *Ebinania* from off Australia's southern coast.

Materials and methods

Counts and measurements follow Nelson (1980). Measurements of soft anatomy are approximate because of the easily distorted bodies of these fish. Vertebral counts were obtained from radiographs. Osteology follows Jackson & Nelson (1998) except that the tabulars and supratemporals are referred to as extrascapulars, following Harrington (1955), and further named according to their associated sensory canal. The extrascapular supporting the lateral portion of the supratemporal canal is the lateral extrascapular, and the extrascapular supporting the transverse portion of this canal is the transverse extrascapular. Although arches 5 and 6 are lateral and transverse extrascapulars, respectively, they are referred to by their arch designation herein to facilitate comparison with previous psychrolutid work. Type specimens are deposited in the Australian National Fish Collection (formerly the I.S.R. Munro Ichthyological

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Collection), Hobart, Tasmania (CSIRO) and the Museum of Victoria, Australia (NMV). Institutional abbreviations follow Leviton *et al.* (1985).

Genus *Ebinania* Sakamoto, 1932

Diagnosis. Species of *Ebinania*, *Neophrynichthys*, and *Psychrolutes* (collectively Psychrolutinae) are distinguished from other psychrolutids in sharing a soft interorbit with the frontal laterally expanded to form a thin flexible orbital rim (Jackson & Nelson, 1998). Species of *Ebinania* differ from those of *Neophrynichthys* and *Psychrolutes* in having prevomerine teeth.

Ebinania australiae n.sp.

Figs 1–2, Tables 1–2

Type material. HOLOTYPE, CSIRO T 412, 206 mm Standard Length (SL), off Cape Sorell, Tasmania, 42°16'S 144°40'E to 42°22'S 144°42'E, 991–548 m, 14 July 1982. PARATYPES: CSIRO T 502, 218 mm SL, off Beachport, South Australia, 37°54'S 139°40'E to 37°50'S 139°36'E, 1000–1000 m, 3 April 1983; CSIRO T 504, 296 mm SL, data same as T 502; CSIRO T 505, 266 mm SL, data same as T 502; CSIRO

T 506, 406 mm SL, data same as T 502; CSIRO T 536, 285 mm SL, off Cape Martin, South Australia, 37°51'S 139°40'E to 37°48'S 139°33'E, 1007–960 m, 25 April 1983; NMV A1977, 112 mm SL, off Cape Naturaliste, Western Australia, 33°17.9'S 114°12.6'E to 33°15.8'S 114°11.1'E, 982 m, 14 February 1991; NMV A2741, 358 mm SL, off Cape Bridgewater, Victoria, Australia, 38°36'S 140°59'E to 38°38'S 141°07'E, 1040–1170 m, 27 June 1982; NMV A2758, 284 mm SL, off Cape Bridgewater, Victoria, Australia, 38°38'S 141°04'E to 38°35'S 140°56'E, 990–1100 m, 27 June 1982.

Diagnosis. A species of *Ebinania* with cirri on the head, well-developed thin and flexible orbital rims, cranial (frontal) arch 3 high and twisted upwards, prevomerine teeth in a continuous band, a single terminal chin pore, obsolete lateral line pores, and an overall pale colour.

Description. Ratios and counts are given in Tables 1 and 2. Body tadpole shaped. Head large, trunk short and tapering to a small tail. Head depressed at orbits and sloping dorsally to a moderately depressed nape. Trunk round, tapering to a moderately compressed peduncle. Orbits forward, snout blunt and wide. Interorbit wide and soft. Mouth large, terminal, and oblique. Jaws equal or upper jaw slightly



Fig. 1. Holotype of *Ebinania australiae*, CSIRO T 412, 206 mm standard length. Top: dorsal aspect, bottom: lateral aspect. Scale: 10 mm.

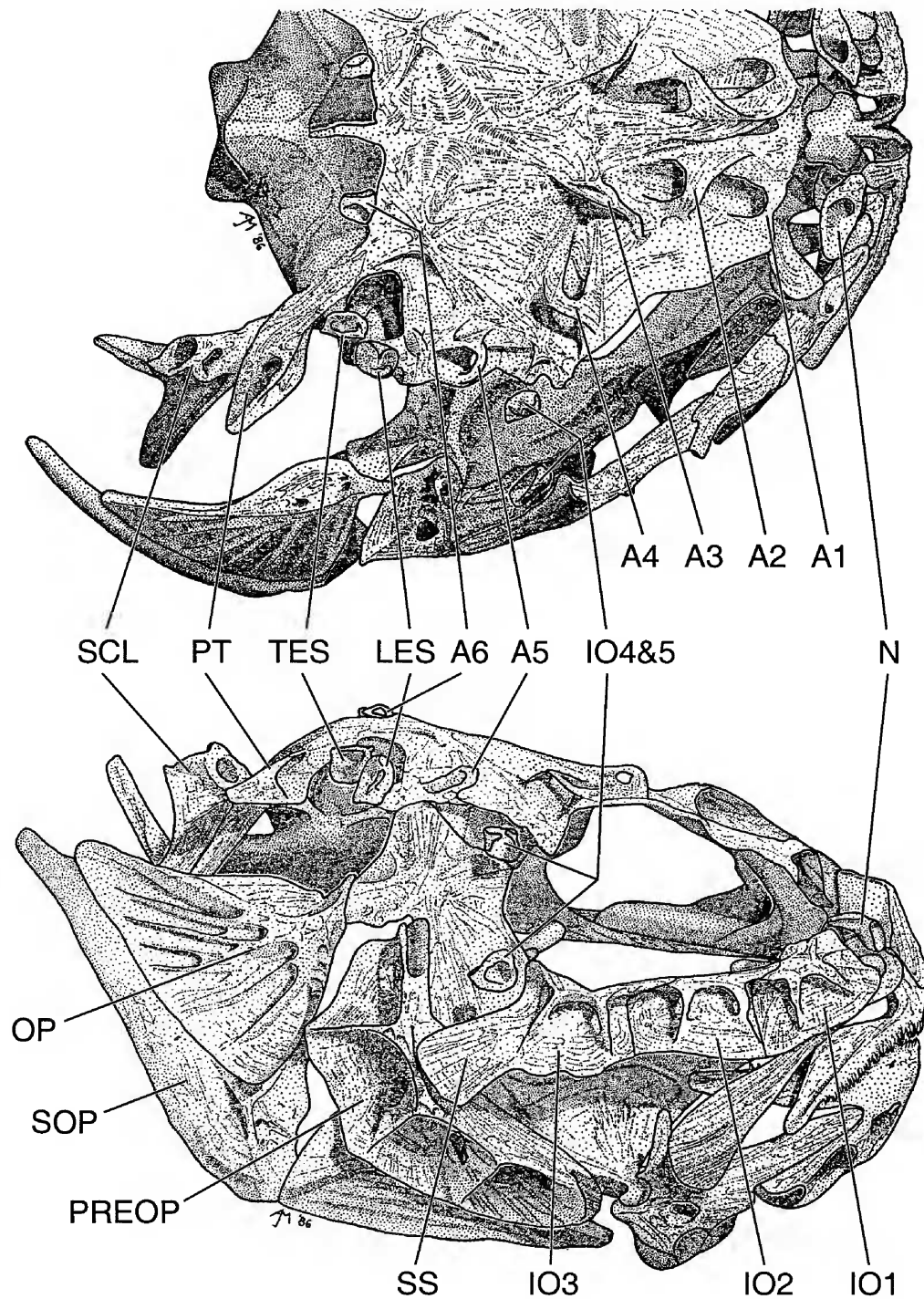


Fig. 2. Superficial cranium of *Ebinania australiae*, CSIRO T 505. Top: dorsal aspect, bottom: lateral aspect. Scale: 10 mm. A1–A6, cranial arches 1–6; IO1–5, infraorbitals 1–5; LES, lateral extrascapular; N, nasal; OP, opercular; PREOP, preopercular; PT, posttemporal; SCL, supracleithrum; SOP, subopercular; SS, suborbital (infraorbital) stay; TES, transverse extrascapular.

protruding. Premaxilla and dentary with a band of villiform teeth in 5–6 (premaxilla) and 4–5 (dentary) irregular rows; prevomer with villiform teeth in a contiguous band of 2–3 irregular rows. Skin thin, gelatinous, very loose, and smooth (lacking prickles). Cirri small, simple or multiheaded, and present around the jaw and less frequently on the snout and head where magnification may be required to detect them. Anterior nostril raised on a tube, posterior nostril flush or only slightly raised on a tube. Terminal chin pore fused and minute. Lateral line pores obsolete.

All fins covered with loose skin. Dorsal fin without a deep notch between spinous and soft rayed parts. Dorsal fin spines barely discernible externally, with only minute nibs at the top of the embedded flabby fin. Lower pectoral fin with notches between ray tips. Caudal fin truncate.

Colour in alcohol very pale amber-brown. Irregular large-scale mottling apparent, though differences between darkest and lightest areas slight; pectoral fins darkest. Peritoneum brown with dark flecks.

Frontals laterally expanded into a thin orbital rim. Frontal

with four large arches. All arches, particularly arch 3, are strongly bilaterally asymmetric. Arch 3 high and twisted upwards. Arch 5 (anteriormost lateral extrascapular) borne upon and fused with pterotic. Arch 6 (medialmost transverse extrascapular) free from parietal. Five infraorbitals, first three well developed and articulated to form a suborbital bar, third with a stay extending to preopercle, last two simple and free tubular bones. Extrascapulars and posterior tubular infraorbitals each with a delicate or incomplete arch.

Variation. Nine specimens of *Ebinania australiae*, four of *E. brephocephala*, and two of *E. vermiculata* were examined. Morphometric and meristic data were also noted from Nelson (1982) and Quéro (2001). Variation of counts for all species of *Ebinania* is shown in Table 1. No single meristic trait or combination of meristic traits separates any of the species of *Ebinania*. However, when more specimens are available, pectoral fin ray counts may prove useful in separating species of this genus as they have been with the genus *Neophrynichthys* (Jackson & Nelson, 2000). Pectoral fin ray counts vary from 19 to 24 amongst the species of *Ebinania* (Table 1). Specimens of *E. vermiculata* span the entire range of the genus in pectoral counts: the two specimens of *E. vermiculata* examined here had 21 and 24 rays, Sakamoto (1932) counted 22 pectoral rays on the holotype, and Watanabe (1960) counted 19 to 21 rays

Table 1. Vertebral and fin counts of *Ebinania australiae* and comparison with counts of other species of *Ebinania*. Number of specimens observed with a particular count given for *E. australiae*. Specimens unknown for a given count indicated with a dash (—). Specimens known from literature and additional material examined with a given count indicated with a plus (+). Specimens known from literature with a given, though questionable, count indicated with a question mark (?).

	count	<i>E. australiae</i>	<i>E. brephocephala</i>	<i>E. costaecanariae</i>	<i>E. macquariensis</i>	<i>E. malacocephala</i>	<i>E. vermiculata</i>
vertebrae	31	2	+	—	—	+	—
	32	7	—	—	—	—	—
	33	—	—	—	+	—	+
dorsal spines	6	2	—	—	—	—	—
	7	7	—	—	+	+	—
	8	—	+	+	—	—	+
dorsal rays	9	—	—	—	—	—	+
	15	1	+	—	—	—	—
	16	1	—	+	—	—	+
	17	5	—	—	—	+	+
anal rays	18	2	—	—	+	—	—
	11	—	—	—	—	—	+
	12	3	—	—	+	+	+
pectoral rays	13	5	+	+	—	—	—
	14	1	+	—	—	—	—
	19	—	+	—	—	—	?
	20	—	+	—	—	+	?
	21	3	—	—	—	—	+
	22	6	—	+	—	—	+
	23	—	—	—	—	—	—
	24	—	—	—	+	—	+

Table 2. Ratios of *Ebinania australiae* given as percent of standard length. Sample size was 9 (holotype and 8 paratypes) for all measurements except for soft tissue snout length (n = 7).

	mean	range
standard length (mm)	270	112–406
body depth	27.5	23.5–32.5
peduncle depth	6.91	5.91–8.23
head length	40.8	34.6–49.5
head width	36.4	29.4–40.7
interorbital width*	14.1	11.7–16.1
upper jaw length	19.0	17.9–20.5
snout length	9.25	6.56–11.1
snout length*	12.9	11.9–13.6
orbit diameter	10.8	9.46–11.8
eye diameter*	5.21	3.84–6.16

* Measured to edge of skin that covers much of the eye.

amongst 12 specimens of *E. vermiculata*. It is possible that Watanabe's (1960) counts may be low because the upper rays of the pectoral fin are very closely spaced and must be counted after dissection of the skin at the pectoral base. Morphometric variation is great (Table 2), probably because of the easily distortable nature of these fishes' bodies. The morphometrics of the nine specimens of *Ebinania australiae* overlap with those of the other species of *Ebinania*, and no morphometric character is useful for the diagnosis.

Two traits used in the diagnosis of *Ebinania australiae* were observed to vary within some species: condition of the terminal chin pore and arrangement of the prevomerine teeth. All specimens of *E. australiae* examined had the terminal chin pore fused and medial, as opposed to paired. Although chin pore state has not been reported to vary within the other species of *Ebinania*, it varied in the specimens of *E. brephocephala* we examined (fused in HUMZ 74774, paired in HUMZ 74784, and indeterminable in the two cleared and stained specimens). The state of this pore is used herein (in conjunction with colour) to separate *E. australiae* from *E. vermiculata*; however, this may not be reliable if it is found to vary in either of these two species as it does in *E. brephocephala*. All specimens of *E. australiae* examined had prevomerine teeth in a continuous band, as opposed to in two blocks separated by a distinct gap. Although the prevomerine teeth state has not been reported to vary within the other species of *Ebinania*, variation was observed in the two specimens of *E. vermiculata*, with teeth in two distinct blocks in HUMZ 34249 and teeth in a continuous band with only a slight medial constriction in HUMZ 78141. The condition of the prevomerine teeth is used herein to separate *E. australiae* from *E. brephocephala* and *E. costaecanariae*; other characters separate these two species should prevomerine teeth be found to vary.

Ebinania australiae is distinguished from *E. brephocephala* and *E. costaecanariae* in having cirri on the head and prevomerine teeth in a continuous band as opposed to two patches separated by a distinct gap at the symphysis. It is distinguished from *E. macquariensis* in having well-developed orbital rims and cranial arch 3 high and twisted upwards as opposed to low and flat. It is distinguished from *E. malacocephala* in having obsolete lateral line pores rather than

pores raised in tubules and prevomerine teeth in a continuous band. It is distinguished from *E. vermiculata* in having a single terminal chin pore and an overall light grey brown body colour as opposed to a medium brown blotchy colour.

Distribution. *Ebinania australiae* is known from southern Australia off the tip of Western Australia (one specimen), off southern South Australia and Victoria (7 specimens), and off Tasmania (one specimen) at 982–1170 m (Fig. 3). The geographically closest congeneric species of *Ebinania australiae* is *E. macquariensis* from Macquarie Island, 1500 km southeast of Tasmania, and the next closest species is *E. malacocephala* from the far southern middle Pacific (54°49.5'S 129°47'W) (both described by Nelson, 1982). Two species, *E. brephocephala* and *E. vermiculata*, are known from the Northwest Pacific off Japan. The sixth species of *Ebinania*, *E. costaecanariae* is known from the eastern Atlantic off Spain (Quéro, 2001) and Africa (Nelson, 1982).

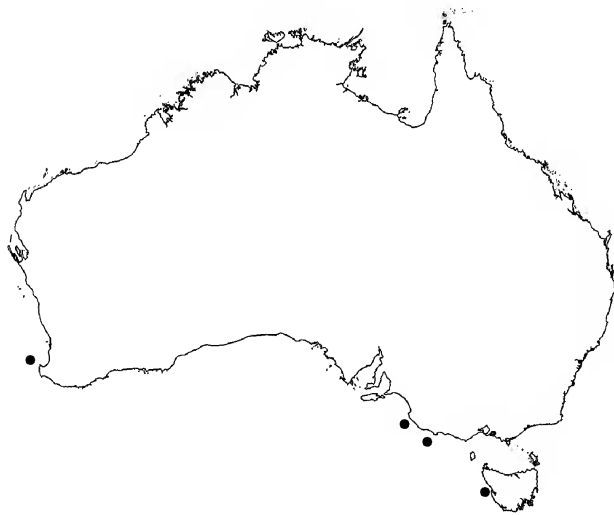


Fig. 3. Locality records for *Ebinania australiae*.

Etymology. The specific name *australiae* refers to the known occurrence of this species. Given the paucity of outwardly apparent specific characteristics within this genus, geographic names seem fitting for newly described allopatric species of this wide ranging genus. Gender feminine.

Discussion

Ebinania australiae is the sixth species to be assigned to the genus *Ebinania*. The species of this genus differ little from each other. In skin ornamentation, cirri are notably reduced to microscopic proportions in *E. brephocephala* and *E. costaecanariae*. Cirri of varying length and of irregular pattern are present in the other four species of *Ebinania*, and they cannot be used to distinguish these four species from each other. Five of the six species have very similar crania, and only *E. macquariensis* is markedly different in this regard, with a relatively narrow interorbit in which the frontals are not greatly expanded into orbital rims. Nelson (1982) also noted the condition of cranial arch 3 as being unique in *E. macquariensis*: low and flat versus high and twisted upwards. This character should be treated

carefully because of the large degree of plasticity in the development of these arches within this genus, and because this species was described from a single specimen. The prevomerine teeth of *E. australiae* are like those of *E. macquariensis* and one specimen of *E. vermiculata* examined, with these teeth being in a continuous band versus in two separate elliptical blocks as in the other specimen of *E. vermiculata* and other species of *Ebinania*. The terminal chin pore is paired in the holotype of the Japanese *E. brephocephala* (Kurt Bruwelheide, NMNH, pers. comm., though variable in the specimens examined here) and *E. vermiculata*, and single in all other species of *Ebinania*. Lateral line pores amongst most species of *Ebinania* are not apparent, although in one species, *E. malacocephala*, these pores are well developed and raised in tubules. In colouration, *E. costaecanariae* stands out with its overall dark pigmentation. As its name implies, *E. vermiculata* has vermiculated pigmentation, although some pattern is also apparent to a lesser and fainter degree in *E. brephocephala* and *E. australiae* (and probably also in *E. macquariensis* and *E. malacocephala*; Nelson, 1982).

Taken individually, the above mentioned characters distinguish three species of *Ebinania*: *E. costaecanariae* (deep colouration), *E. macquariensis* (narrow interorbit), and *E. malacocephala* (lateral line pores raised on tubules). The remaining three species are distinguished by combinations of characters, as is *E. australiae* in its diagnosis above. Morphologically, the new species appears to be most similar to *E. macquariensis*, differing from it only in the condition of the cranium (interorbit), and to *E. vermiculata*, differing from it in the condition of the terminal chin pore and colouration.

Geographically, *Ebinania australiae* is isolated from its nearest congeners. It is more than 1500 km from *E. macquariensis*. The next closest species, *E. malacocephala*, is considerably more isolated in the extreme southern-central Pacific. For the most part, continental waters connect Australia with Southeast Asia, and Japan, where *E. brephocephala* and *E. vermiculata* occur. The sixth and most geographically distant species, *E. costaecanariae*, has the widest geographic range within the genus, being found from northern Spain to southern Africa. *Liparoides beauchampi*, possibly a species of *Ebinania*, was collected off India, but unfortunately, the holotype of this enigmatic species is lost (Stein, 1978).

Ebinania australiae fits the generic diagnosis for *Ebinania* and does not challenge the validity of its subfamily or family. This new species brings the number of psychrolutids known from off continental Australia to three, *Psychrolutes marcidus* (McCulloch, 1926), *Psychrolutes occidentalis* Fricke, 1990, and now *Ebinania australiae*. Two other psychrolutids, *Ambophthalmos magnicirrus* and *Ebinania macquariensis* are known from Macquarie Island, Australia. The family now includes 34 species. Two of the three species found off continental Australia were described within the last 15 years and five of the six New Zealand psychrolutids were described since 1977 (Jackson & Nelson, 2000). The Southern Hemisphere is a fertile ground for discovery of new psychrolutids; material from a new locality, possibly *Psychrolutes microporos*, has already been collected from the Lord Howe Plateau and Wanganella Bank east of Australia (Martin Gomon, NMV, pers. comm.).

Key to the species of *Ebinania*

- 1 Cirri, if present, microscopic on head and body; prevomerine teeth in two patches in adults 2
 — Short cirri on head; prevomerine teeth continuous or in two patches 3
- 2 Dorsal rays 24–25; pectoral rays 22–24; fresh colour dark brown to black *Ebinania costaecanariae* (Cervigón, 1961)
 — Dorsal rays 20–23; pectoral rays 17–19; fresh colour light brown *Ebinania brephocephala* (Jordan & Starks, 1903)
- 3 Lateral line pores distinct; prevomerine teeth in two patches in adults; pectoral rays about 20 *Ebinania malacocephala* Nelson, 1982
 — Lateral line pores obsolete; prevomerine teeth continuous; pectoral rays usually more than 20 4
- 4 Paired chin pores *Ebinania vermiculata* Sakamoto, 1932
 — Terminal chin pore 5
- 5 Cranial arches 2 and 3 distant from edge of well-developed orbital rim; pectoral rays 21–22 *Ebinania australiae* n.sp.
 — Cranial arches 2 and 3 close to edge of orbital rim; pectoral rays 24 *Ebinania macquariensis* Nelson, 1982

Comparative material examined

Ebinania brephocephala: HUMZ 51823, cleared and stained, Owase, Mie, Japan, 350 m, 13 March 1976; HUMZ 52187, cleared and stained, Japan, 25 March 1976; HUMZ 74774, 110 mm SL, Kochi, Japan; HUMZ 74784, 108 mm SL, Kochi, Japan. *Ebinania vermiculata*: HUMZ 34249, 302 mm SL, 42°1.0'N 143°43.6'E, 380 m, 18 April 1974; HUMZ 78141, 232 mm SL, 39°10.3'N 142°25.0'E, 1000 m, 19 August 1978.

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References

- Cervigón, F., 1961. Descripción de *Anodontus mauritanicus* nov. gen. nov. sp. (orden Ateleopiformes) y *Cottunculus costaecanariae* nov. sp. (familia Cottidae) de las costas occidentales de Africa. *Investigacion Pesquera* 19: 119–128. [In Spanish].
- Fricke, R., 1990. A new species of Psychrolutid fish from western Australia. *Japanese Journal of Ichthyology* 36: 404–409.
- Harrington Jr, R.W., 1955. The osteocranium of the American cyprinid fish, *Notropis bifrenatus*, with an annotated synonymy of teleost skull bones. *Copeia* 1955: 267–290.
- Jackson, K.L., & J.S. Nelson, 1998. *Ambophthalmos*, a new genus for “*Neophrynichthys*” *angustus* and “*N.*” *magnicirrus*, and the systematic interrelationships of the fathead sculpins (Cottoidei, Psychrolutidae). *Canadian Journal of Zoology* 76: 1344–1357.
- Jackson, K.L., & J.S. Nelson, 2000. *Neophrynichthys heterospilos*, a new species of fathead sculpin (Scorpaeniformes: Psychrolutidae) from New Zealand. *New Zealand Journal of Marine and Freshwater Research* 34: 719–726.
- Jordan, D.S., & E.C. Starks, 1903. Description of a new species of sculpin from Japan. *Proceedings of the United States National Museum* 26: 689–690.
- Leviton, A.E., R.H. Gibbs Jr, E. Heal & C.E. Dawson, 1985. Standards in ichthyology and herpetology: Part 1. Standard symbolic codes for institutional resource collections in herpetology and ichthyology. *Copeia* 1985: 802–832.
- McCulloch, A.R., 1926. Report on some fishes obtained by the F.I.S. “Endeavour” on the coasts of Queensland, New South Wales, Victoria, Tasmania, South and southwestern Australia. *Endeavour* 5: 155–216.
- Nelson, J.S., 1980. *Psychrolutes sio*, a new psychrolutid fish (Scorpaeniformes) from the southeastern Pacific. *Canadian Journal of Zoology* 58: 443–449.
- Nelson, J.S., 1982. Two new south Pacific fishes of the genus *Ebinania* and contributions to the systematics of Psychrolutidae (Scorpaeniformes). *Canadian Journal of Zoology* 60: 1470–1504.
- Quéro, J.-C., 2001. Premier signalment d’*Ebinania costaecanariae* (Scorpaeniformes: Psychrolutidae) en Atlantique nord-est et distribution bathymétrique de *Cottunculus thomsonii*. *Cybium* 25: 177–180. [In French with English abstract].
- Sakamoto, K., 1932. Two new genera and species of cottoid fishes from Japan. *Journal of the Imperial Fisheries Institute of Japan* 27: 1–6.
- Stein, D.L., 1978. *Liparoides beauchampi* not a cyclopterid but probably a cottid. *Copeia* 1978: 377–378.
- Watanabe, M., 1960. Fauna Japonica Cottidae (Pisces). Biogeographical Society of Japan. Tokyo: National Science Museum.
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